

Graphing from the Unit Circle

1. Place a string on the unit circle at 0° , which is the point $(1, 0)$, and wrap it counterclockwise around the circle. Try to make the string be as exact along the circle's edge as possible. Make marks on the string at every mark on the outside of your circle (the special angle measures).
2. Lay your string along your x-axis. *The end of the string that was at 0° must be placed at the origin of the function graph.* Transfer the marks on the string onto the x-axis of the graph. Label these marks on the x-axis with the related angle measures from the unit circle (e.g., 0° , 30° , 45° , etc.). Do this a second time and keep counting from 360° to label your paper up to 720° .
3. Cut a piece of pipe cleaner to be the length of the radius of your unit circle. This is now the length of 1 unit. Use the pipe cleaner to mark one unit above and below the origin on the y-axis of the graph. Label these marks 1 and -1, respectively.
4. Draw a right triangle in the unit circle to the 30° mark. (Note: the hypotenuse is the radius of the circle, the base is the x-axis, and the height is perpendicular to the x-axis). Cut a pipe cleaner to the length of the vertical leg of this triangle, from the 30° mark on the circle to the x-axis. Let this piece of pipe cleaner represent the y-value for the point on the function graph where $x = 30^\circ$.
5. Place the piece of pipe cleaner appropriately on the graph (i.e. at $x = 30^\circ$) and make a dot at the top of it. **Note:** Since this point is above the x-axis in the unit circle, the corresponding point on the function graph should also be above the x-axis.
6. Continue constructing triangles, cutting pipe cleaners, and transferring lengths for all marks on the unit circle. NOTE: you should only need to cut 2 more lengths of pipe cleaner. After you have constructed all the triangles, transferred the lengths of the vertical legs to the function graph, and added the dots, draw a smooth curve to connect the dots. Do this for 0° to 720° .
7. Take one triangle you drew and label the sides O,A,H. (Consider the reference angle to be at the origin). If x is the vertical leg of a triangle and $H=1$, set up an equation to solve for x.

So you have just graphed the function $y =$ _____

Stop: Raise your hand when you get this far so Ms. W can check your work.

OK _____

Name _____ Date _____ Block _____

Exploring your graph from the Unit Circle

1. Label your graph $y = \sin x$.
2. What is the period of the sine curve? (That is, after how many degrees does the graph start to repeat?)
3. What are the zeros of this function? (Remember that the x -values are measured in degrees and zeroes are the x -intercepts/solutions/roots.)
4. What are the maximum and minimum y -values?
Max: _____ Min: _____
5. At which x -values does the function reach its maximum and minimum y -values?
Max: _____ , _____ Min: _____ , _____
6. What are the amplitude and midline of the graph?
Midline is $y =$ _____ Amplitude = _____
7. Explain why $\sin 30^\circ = \sin 150^\circ$.
8. Explain why $\sin 30^\circ = \sin 390^\circ$.
9. Use your ideas from #6 to predict the value of $y = \sin x$ when x is 810° . Explain your thinking.

Stop: Raise your hand when you get this far so Ms. W can check your work.

OK _____



